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CALIFORNIA SEA LION AND NORTHERN ELEPHANT SEAL PUP COUNTS AND TAGGING AT SANTA BARBARA ISLAND, CALIFORNIA, FROM JUNE 1983 THROUGH JULY 1986

By

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ADMINISTRATIVE REPORT LJ-87-03

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California Sea Lion and Northern Elephant Seal Pup Counts and Tagging at Santa Barbara Island, California, from June 1983 through July 1986

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INTRODUCTION

Santa Barbara Island (SBI) is one of eight Channel Islands located off the coast of southern California (Figure 1). SBI and the islands of Anacapa, Santa Cruz, Santa Rosa and San Miguel make up Channel Islands National Park (CINP). The majority of the island is bordered by steep cliffs. It is approximately 2.7 kilometers long and covers about 635 acres.

Three pinniped species are found at SBI: California sea lions (Zalophus californianus), northern elephant seals (Mirounga angustirostris), and harbor seals (Phoca vitulina). We began monitoring California sea lions and northern elephant seals at SBI in June 1983 and February 1984, respectively, to provide data for population assessments. We monitor these pinniped species by making annual pup counts during the pupping season and by tagging a fraction of the pups produced each year. We also monitor food habits of sea lions by collecting and analyzing fecal material (i.e. scats). In this report we will only address sea lion and elephant seal pup counts and tagging at SBI.

METHODS

Pup Counts

We counted California sea lion pups in late June or early July which is the time the greatest number are found during the pupping season (Heath and Francis, 1983). We counted pups on 30 June 1983, 11-12 July 1984, 5-6 July 1985, and 9-10 July 1986. We stratified our counts by area using the Bureau of Land Management (BLM) area code system (Figure 2). We counted animals from atop the cliffs around the island or at closer locations if animals were not disturbed. Non-pups (which include juveniles, adult females, and sub-adult males) and adult males were also counted during the 1986 pup count. We used hand held binoculars, a 20-45X zoom spotting scope, or the unaided eye. The method of observation was governed by the proximity of the animals to the observer. The animals were tallied with hand-held counters, and the counts were recorded in a notebook or onto a map of the island to indicate their location.

We counted northern elephant seal pups in February, which is near the end of the breeding season, or in March after the pups had been weaned (Le Boeuf, 1972). We counted pups on 7-8 February 1984, 8-11 March 1985, and 20 March 1986. We stratified

the counts by area using the BLM area code system (Figure 2). At Elephant Seal Cove we counted the pups from the beach during all years. Pups located at other elephant seal pupping areas of the island were counted from the cliffs around the island in 1984 and 1985, and in 1986 by sea from a Zodiak raft. We used hand-held binoculars, or the unaided eye. The animals were tallied with hand-held counters, and the counts were recorded in a notebook or onto a map of the island to indicate location.

On 16 February 1986 a CINP ranger stationed at SBI made elephant seal pup counts from the cliff-top and provided us with the counts.

Pup Tagging

We tagged sea lion pups on 23-25 August 1983 and 5-7 September 1984 at the Southeast Rookery (Figure 2). We either herded the pups into small groups or because most pups were near the waters' edge we captured single individuals with hand-held hoop nets. We determined the sex of each pup and then placed one tag through the distal portion of each foreflipper. We used light blue, soft plastic reise tags that were uniquely numbered. In 1984 each animal was weighed and its condition was recorded as good, fair, or poor. A good conditioned animal looked healthy and had a thick blubber coat. The pelvic bones of an animal in poor condition could be seen. A fair conditioned animal was intermediate to the good and poor conditions. The weights of sea lion pups tagged in 1984 were measured to the nearest pound (data are reported in kg). All data were recorded into a data book during the tagging operations and were later transcribed onto computer coding forms before being entered onto a computer database.

We tagged elephant seal pups on 7-8 February 1984, 8-11 March 1985, and 20 March 1986. In 1984 we tagged at Elephant Seal Cove and at the south cove of Webster Point (Figure 2). In 1985 and 1986 we tagged at Elephant Seal Cove. We used light blue, soft plastic reise tags that were uniquely numbered. We placed one tag to the distal edge of the inter-digit webbing of each hind flipper. The majority of the animals were double-tagged. In 1985 and 1986 the condition of the animal was recorded as good, fair, or poor (for definition of condition see page 3). The sex of the animals were determined whenever possible during each year. All data were recorded into a data book during the tagging operations and were later transcribed onto computer coding forms before being entered onto a computer database.

RESULTS

Pup Counts

The counts of sea lion pups were 237 on 30 June 1983, 280 on 11 and 12 July 1984, 543 on 5 and 6 July 1985, and 814 on 9 and 10 July 1986 (Table 1). Hansen believed the 1983 count was incomplete because he found places where pups were out of view.

He estimated a total island pup count of 350 to 500 with a mean of 425. Excluding the 1983 data, the Southeast Rookery (BLM areas 317, 322, and 325) accounted for the majority (52% to 60%) of sea lion pups produced at SBI (Table 2). Elephant Seal Cove (BLM areas 310, 311, and 312) accounted for 21% and 34% of the pups in 1984 and 1986, respectively, but only 7% in 1985. The southern coves at Webster Point (BLM areas 303, 304, and 305) accounted for 9%, 7%, and 4% of the pups counted in 1984, 1985, and 1986, respectively. The northern coves at Webster Point (BLM areas 308 and 309) accounted for 16%, 25%, and 9% of the pups counted in 1984, 1985, and 1986, respectively. A breeding site at the beach which faces Sutil Island in BLM area 302 (Figure 2) was discovered in 1986, but only four pups were found (Tables 1 and 2).

Eighty, 93, and 57 elephant seal pups were counted during 1984, 1985, and 1986, respectively (Table 3). Elephant Seal Cove (BLM area 310) accounted for 85%, 78%, and 95% of the pups counted in 1984, 1985, and 1986, respectively. Pups were also found at the south cove of Webster Point in BLM areas 304 and 305, the beach on the southeast shore of the island in BLM area 302, and the cove at the end of Graveyard Canyon in BLM area 322.

The elephant seal pup counts taken on 16 February 1986 and on 20 March 1986 were 36 and 57, respectively (Table 3). There were more adult females and adult males present on 16 February than on 20 March. No pups were being nursed on 20 March which indicated that all were weaned. On 20 March the pelage of all pups was subjectively determined to be at least one-fourth molted, but the majority of the pups had completed the molt. On 20 March, many pups were observed to be up against the cliff or in a cave which was not visible from the cliff-top where the CINP ranger made his counts on 16 February.

Pup Tagging

We tagged 187 sea lion pups at the Southeast Rookery of SBI during this study (Table 4). Of these, 113 were tagged in 1983 and 74 were tagged in 1984. Of the 113 pups tagged in 1983, 50 (44%) were male and 63 (56%) were female. Of the 74 pups tagged in 1984, 40 (56%) were male, 33 (43%) were female, and the sex of one sea lion (1%) was not determined.

The mean weight of male sea lions was 39 lbs (18 kgs) with a standard deviation of 7.76 lbs (3.52 kgs). Male animals weighed 22 lbs (10 kgs) to 53 lbs (24 kgs). The mean weight of female sea lions was 36 lbs (16 kgs) with a standard deviation of 8.60 lbs (3.90 kgs). Female animals weighed 17 lbs (8 kgs) to 57 lbs (26 kgs). A t-Test analysis did not indicate any significant differences between the weights of male and female pups ($P = 0.077$).

We tagged 110 elephant seal pups at SBI since 1984 (Table 5). Of the 22 tagged in 1984, four were tagged at the south cove of Webster Point and 18 were tagged at Elephant Seal Cove. In 1985 and 1986 we tagged 55 pups and 33 pups, respectively, at Elephant Seal Cove. Of the 22 pups tagged in 1984, only 15 were sexed (7 males and 6 females). Of the 55 pups tagged in 1985, 19 were males, 31 were females, and 5 were not sexed. Of the 33 pups tagged in 1986, 18 were male, 14 were female, and one was not sexed.

DISCUSSION

The fluctuation in the numbers of sea lion pups counted among years probably reflects the effects of the 1982-84 California El Nino on the sea lion population. During this time, the Southern California Bight was affected by unusual oceanographic and biological conditions (Fiedler et al., 1986). The sea lion pup counts of 327 in 1983 by Stewart and Yochem (1984) and our counts of 280 in 1984 were very low and occurred during this El Nino An increase in the number of sea lion pups produced was observed in 1985 and 1986 when El Nino affects were absent. Counts of sea lion pups previous to this El Nino period in 1981 and 1982 by Heath and Francis (1983) also indicated higher pup production at SBI during non-El Nino years.

The low number of elephant seal pups counted in 1986, as compared to the 1984 and 1985 count, could be the result of (1) winter storms which occurred during February 1986, (2) weaned pups having gone to sea by the time the 20 March count was made, or (3) fewer births. Severe winter storms are the probable cause for the majority of elephant seal pup mortality at SBI because the narrow pupping beaches that are bordered by steep cliffs do not provide them with sufficient area to escape high tides when accompanied by large waves. Because elephant seals breed during winter months, pup mortality may result from severe winter storms because pups have not learned to swim. Reiter et al. (1978) reports that pups at Ano Nuevo Island in 1974-75 began to learn to swim in mid-February to mid-March; and that weaned pups begin to depart the rookery in April. Reiter et al. (1978) also show that approximately 3% to 13% of weaned pups have left the rookery by 20 March. If we assume the same departure rate of weaned animals for SBI, there would still be fewer pups produced at SBI in 1986 than 1984 or 1985. Thus, it is probable that the combination of winter storms and fewer births resulted in lower pup production at SBI in 1986.

Antonelis et al. (1981) reported 12 elephant seal pups at SBI in 1964, 26 (27 estimated) in 1972 and 37 (40 estimated) in 1978. Our counts in 1984 were 80, in 1985 were 93, and in 1986 were 57. Although our 1986 counts were our lowest, there is still an upward trend in the number of pups found at SBI if the counts reported by Antonelis et al. and ours are examined over the long term.

The 36 elephant seal pups counted in 16 February 1986 from the cliff-top and 57 elephant seal pups counted in 20 March 1986 from the beach and raft indicates that all pups may not be counted from the cliff-top, specially at Elephant Seal Cove. The birth of additional pups since 16 February could not account for these differences because there were no pups being nursed on 20 March and because the pelage of pups present on 20 March was at least one fourth molted and some had completed the molt. However, during the 20 March count we found pups inhabiting a cave when the beach count was made at Elephant Seal Cove. Cliff-top counts of elephant seal pups at Elephant Seal Cove, therefore, should be considered minimal estimates.

The tagging study complements pup counts by marking a proportion of the pups born each year and provides data which can be used in making assessments of a population. Animals tagged as pups are useful in biological studies where the age of the animal is important. Tagged animals can also be used in behavioral studies of individual animals where repeated observations of the same animal are needed. The results of the data obtained of these tagged animals will be reported later when more information is available.

The results of our pup counts will be used for future population assessments of California sea lions and northern elephant seals.

ACKNOWLEDGEMENTS

We would like to thank Channel Islands National Park (CINP) for allowing us to work at SBI. We are specially grateful for the assistance given by Frank Ugolini and Karen Johnston of CINP. We also thank the CINP rangers stationed at SBI during our study; their assistance and company were greatly appreciated. We also thank the people who helped us tag sea lion and elephant seal pups at SBI.

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Table 1. California sea lion counts arranged by BLM code which were obtained during 1983 through 1986 at Santa Barbara Island, California.

BLM AREA	*1983* PUPS	1984 PUPS	1985 PUPS	1986 PUPS	1986 NON-PUPS	1986 ADULT MALES
302	0	0	0	4	46	6
303	2	23		24	50	7
303/304			38			
304	23	3		4	51	3
305	0	0	0	3	70	1
308	6	0	30	10	47	8
309	25	44	107	67	91	8
310	0	6	0	0	0	0
311	112	54	40	196	193	13
312	0	0	0	79	70	6
314	0	0		?	2	1
317	69	150	0	239	203	13
318	0	0	0	20	10	2
322	0	0	0	121	242	12
325	0	0		47	79	9
317/325			328			
TOTAL	*237*	280	543	814	1154	89

* L. Hansen determined that these counts were minimal counts because all pups were not visible. He estimated an island pup population of 350 to 500 with a mean of 425.

Table 2. Summary of California sea lion counts obtained at Santa Barbara Island, California from 1983 through 1986.

Date(s)	Sex/Age Class	Southeast Rookery		Elephant Seal Cove		Webster Point South Cove		Webster Point North Cove		Beach facing Sutil Island		Arch Point		Island total
		N	%	N	%	N	%	N	%	N	%	N	%	
30 June 1983	Pups	*69		*112		*25		*31		*0		*0		*237
11-12 July 1984	Pups	150	54	60	21	26	9	44	16	0	0	0	0	280
5-6 July 1985	Pups	328	60	40	7	38	7	137	25	0	0	0	0	543
9-10 July 1986	Pups	427	52	275	34	31	4	77	9	4	<1	?	?	814
	Non-pups	534	46	263	23	171	15	138	12	46	4	2	<1	1154
	Adult males	36	40	19	21	11	12	16	18	6	7	1	1	89

* L. Hansen determined that these counts were minimal counts because all pups were not visible. He estimated an island pup population of 350 to 500 with a mean of 425.

NOTE: The sum of percentages may not equal 100% due to rounding.

Table 3. Northern elephant seal counts obtained at Santa Barbara Island, California from 1984 through 1986.

	Sex/Age Class	Graveyard Canyon Cove (BLM 322)	Elephant Seal Cove (BLM 310)	Webster Point South Cove (BLM 304-305)	Southeast shore (BLM 302)	Island total
7-8 February 1984	Pups	0	68	12	0	80
	Yearlings	0	4	1	0	5
	Adult females	0	45	9	0	54
	Sub-adult males	0	1	1	0	2
	Adult males	0	3	1	0	4
7-14 March 1985	Pups	4	73	1	15	93
	Non-pups	3	2	2	11	18
	Adult males	0	2	0	1	3
16 February 1986	Pups					36
	Females					48
	Adult males					10
20 March 1986	Pups	0	54	3	0	57
	Yearlings	0	4	-	0	4
	Sub-adult females	0	4	-	0	4
	Adult females	11	11	-	0	22
	Sub-adult males	0	1	-	0	1
	Non-pups	-	-	21	0	21
	Adult males	0	0	1	0	1

Table 4. California sea lion pups tagged with Dalton light blue reise tags at Santa Barbara Island, California in 1983 and 1984.

Tag Number Left	Right	Sex	Date Tagged Month	Day	Year	Weight (lbs)	(kgs)	Animal Condition	BLM AREA	GEOGRAPHICAL POSITION LATITUDE	LONGITUDE
226	226	M	AUG	23	1983				317	33 28 10 N	119 01 48 W
227	227	M	AUG	23	1983				317	33 28 10 N	119 01 48 W
228	228	F	AUG	23	1983				317	33 28 10 N	119 01 48 W
229	229	M	AUG	23	1983				317	33 28 10 N	119 01 48 W
230	230	F	AUG	23	1983				317	33 28 10 N	119 01 48 W
231	231	F	AUG	23	1983				317	33 28 10 N	119 01 48 W
232	232	F	AUG	23	1983				317	33 28 10 N	119 01 48 W
233	233	F	AUG	23	1983				317	33 28 10 N	119 01 48 W
234	234	F	AUG	23	1983				317	33 28 10 N	119 01 48 W
235	235	M	AUG	23	1983				317	33 28 10 N	119 01 48 W
236	236	M	AUG	23	1983				317	33 28 10 N	119 01 48 W
237	237	M	AUG	23	1983				317	33 28 10 N	119 01 48 W
238	238	M	AUG	23	1983				317	33 28 10 N	119 01 48 W
239	239	M	AUG	23	1983				317	33 28 10 N	119 01 48 W
240	240	F	AUG	23	1983				317	33 28 10 N	119 01 48 W
241	241	F	AUG	23	1983				317	33 28 10 N	119 01 48 W
242	242	F	AUG	23	1983				317	33 28 10 N	119 01 48 W
243	243	F	AUG	23	1983				317	33 28 10 N	119 01 48 W
244	244	F	AUG	23	1983				317	33 28 10 N	119 01 48 W
245	245	M	AUG	23	1983				317	33 28 10 N	119 01 48 W
246	246	F	AUG	23	1983				317	33 28 10 N	119 01 48 W
247	247	M	AUG	23	1983				317	33 28 10 N	119 01 48 W
248	248	M	AUG	23	1983				317	33 28 10 N	119 01 48 W
249	249	F	AUG	23	1983				317	33 28 10 N	119 01 48 W
250	250	F	AUG	23	1983				317	33 28 10 N	119 01 48 W
251	251	F	AUG	23	1983				317	33 28 10 N	119 01 48 W
252	252	F	AUG	23	1983				317	33 28 10 N	119 01 48 W
253	253	F	AUG	23	1983				317	33 28 10 N	119 01 48 W
254	254	M	AUG	23	1983				317	33 28 10 N	119 01 48 W
255	255	M	AUG	23	1983				317	33 28 10 N	119 01 48 W
256	256	F	AUG	23	1983				317	33 28 10 N	119 01 48 W
257	257	F	AUG	23	1983				317	33 28 10 N	119 01 48 W
258	258	F	AUG	23	1983				317	33 28 10 N	119 01 48 W
259	259	F	AUG	23	1983				317	33 28 10 N	119 01 48 W
260	260	F	AUG	23	1983				317	33 28 10 N	119 01 48 W
261	261	F	AUG	23	1983				317	33 28 10 N	119 01 48 W
262	262	M	AUG	23	1983				317	33 28 10 N	119 01 48 W
263	263	M	AUG	24	1983				317	33 28 10 N	119 01 48 W
264	264	F	AUG	24	1983				317	33 28 10 N	119 01 48 W
265	265	M	AUG	24	1983				317	33 28 10 N	119 01 48 W
266	266	F	AUG	24	1983				317	33 28 10 N	119 01 48 W
267	267	F	AUG	24	1983				317	33 28 10 N	119 01 48 W
268	268	M	AUG	24	1983				317	33 28 10 N	119 01 48 W

Animal condition codes: G = Good; F = Fair; and P = Poor.

Table 4. (Continued)

Tag Number Left	Right	Sex	Date Tagged Month	Day	Year	Weight (lbs)	(kgs)	Animal Condition	BLM AREA	GEOGRAPHICAL POSITION LATITUDE	LONGITUDE
269	269	F	AUG	24	1983				317	33 28 10 N	119 01 48 W
270	270	M	AUG	24	1983				317	33 28 10 N	119 01 48 W
271	271	F	AUG	24	1983				317	33 28 10 N	119 01 48 W
272	272	F	AUG	24	1983				317	33 28 10 N	119 01 48 W
273	273	M	AUG	24	1983				317	33 28 10 N	119 01 48 W
274	274	F	AUG	24	1983				317	33 28 10 N	119 01 48 W
275	275	F	AUG	24	1983				317	33 28 10 N	119 01 48 W
276	276	F	AUG	24	1983				317	33 28 10 N	119 01 48 W
277	277	M	AUG	24	1983				317	33 28 10 N	119 01 48 W
278	278	F	AUG	24	1983				317	33 28 10 N	119 01 48 W
279	279	F	AUG	24	1983				317	33 28 10 N	119 01 48 W
280	280	M	AUG	24	1983				317	33 28 10 N	119 01 48 W
281	281	F	AUG	24	1983				317	33 28 10 N	119 01 48 W
282	282	F	AUG	24	1983				317	33 28 10 N	119 01 48 W
283	283	M	AUG	24	1983				317	33 28 10 N	119 01 48 W
284	284	M	AUG	24	1983				317	33 28 10 N	119 01 48 W
285	285	M	AUG	24	1983				317	33 28 10 N	119 01 48 W
286	286	M	AUG	24	1983				317	33 28 10 N	119 01 48 W
287	287	F	AUG	24	1983				317	33 28 10 N	119 01 48 W
288	288	M	AUG	24	1983				317	33 28 10 N	119 01 48 W
289	289	F	AUG	24	1983				317	33 28 10 N	119 01 48 W
290	290	F	AUG	24	1983				317	33 28 10 N	119 01 48 W
291	291	F	AUG	24	1983				317	33 28 10 N	119 01 48 W
292	292	M	AUG	24	1983				317	33 28 10 N	119 01 48 W
293	293	F	AUG	24	1983				317	33 28 10 N	119 01 48 W
294	294	M	AUG	24	1983				317	33 28 10 N	119 01 48 W
295	295	F	AUG	24	1983				317	33 28 10 N	119 01 48 W
296	296	F	AUG	24	1983				317	33 28 10 N	119 01 48 W
297	297	F	AUG	24	1983				317	33 28 10 N	119 01 48 W
298	298	M	AUG	24	1983				317	33 28 10 N	119 01 48 W
299	299	M	AUG	24	1983				317	33 28 10 N	119 01 48 W
300	300	M	AUG	24	1983				317	33 28 10 N	119 01 48 W
301	301	M	AUG	24	1983				317	33 28 10 N	119 01 48 W
302	302	F	AUG	24	1983				317	33 28 10 N	119 01 48 W
303	303	F	AUG	24	1983				317	33 28 10 N	119 01 48 W
304	304	F	AUG	24	1983				317	33 28 10 N	119 01 48 W
305	305	M	AUG	24	1983				317	33 28 10 N	119 01 48 W
306	306	M	AUG	24	1983				317	33 28 10 N	119 01 48 W
307	307	M	AUG	24	1983				317	33 28 10 N	119 01 48 W
308	308	F	AUG	24	1983				317	33 28 10 N	119 01 48 W
309	309	F	AUG	24	1983				317	33 28 10 N	119 01 48 W
310	310	M	AUG	24	1983				317	33 28 10 N	119 01 48 W
311	311	M	AUG	24	1983				317	33 28 10 N	119 01 48 W
312	312	F	AUG	24	1983				317	33 28 10 N	119 01 48 W

Animal condition codes: G = Good; F = Fair; and P = Poor

Table 4. (Continued)

Tag Number Left	Right	Sex	Date Tagged Month	Day	Year	Weight (lbs)	(kgs)	Animal Condition	BLM AREA	GEOGRAPHICAL POSITION LATITUDE	LONGITUDE
313	313	F	AUG	24	1983				317	33 28 10 N	119 01 48 W
314	314	M	AUG	24	1983				317	33 28 10 N	119 01 48 W
315	315	F	AUG	24	1983				317	33 28 10 N	119 01 48 W
316	316	F	AUG	25	1983				317	33 28 10 N	119 01 48 W
317	317	F	AUG	25	1983				317	33 28 10 N	119 01 48 W
318	318	M	AUG	25	1983				317	33 28 10 N	119 01 48 W
319	319	M	AUG	25	1983				317	33 28 10 N	119 01 48 W
320	320	F	AUG	25	1983				317	33 28 10 N	119 01 48 W
321	321	F	AUG	25	1983				317	33 28 10 N	119 01 48 W
322	322	M	AUG	25	1983				317	33 28 10 N	119 01 48 W
323	323	M	AUG	25	1983				317	33 28 10 N	119 01 48 W
324	324	F	AUG	25	1983				317	33 28 10 N	119 01 48 W
325	325	F	AUG	25	1983				317	33 28 10 N	119 01 48 W
326	326	M	AUG	25	1983				317	33 28 10 N	119 01 48 W
327	327	F	AUG	25	1983				317	33 28 10 N	119 01 48 W
328	328	F	AUG	25	1983				317	33 28 10 N	119 01 48 W
329	329	F	AUG	25	1983				317	33 28 10 N	119 01 48 W
330	330	M	AUG	25	1983				317	33 28 10 N	119 01 48 W
331	331	M	AUG	25	1983				317	33 28 10 N	119 01 48 W
332	332	M	AUG	25	1983				317	33 28 10 N	119 01 48 W
333	333	F	AUG	25	1983				317	33 28 10 N	119 01 48 W
334	334	M	AUG	25	1983				317	33 28 10 N	119 01 48 W
335	335	M	AUG	25	1983				317	33 28 10 N	119 01 48 W
336	336	F	AUG	25	1983				317	33 28 10 N	119 01 48 W
337	337	M	AUG	25	1983				317	33 28 10 N	119 01 48 W
360	360	F	SEP	5	1984	56	25.4	G	317	33 28 10 N	119 01 48 W
361	362	F	SEP	5	1984	37	16.8	G	317	33 28 10 N	119 01 48 W
363	363	M	SEP	5	1984	42	19.1	G	317	33 28 10 N	119 01 48 W
364	364	M	SEP	5	1984	37	16.8	G	317	33 28 10 N	119 01 48 W
365	365	M	SEP	5	1984	45	20.4	G	317	33 28 10 N	119 01 48 W
366	366	M	SEP	5	1984	40	18.1	G	317	33 28 10 N	119 01 48 W
367	367	M	SEP	5	1984	46	20.9	G	317	33 28 10 N	119 01 48 W
368	368	M	SEP	5	1984	49	22.2	G	317	33 28 10 N	119 01 48 W
369	369	F	SEP	5	1984	39	17.7	F	317	33 28 10 N	119 01 48 W
370	370	F	SEP	5	1984	25	11.3	F	317	33 28 10 N	119 01 48 W
371	371	M	SEP	5	1984	22	10.0	P	317	33 28 10 N	119 01 48 W
372	372	M	SEP	5	1984	26	11.8	F	317	33 28 10 N	119 01 48 W
373	373	M	SEP	5	1984	31	14.1	G	317	33 28 10 N	119 01 48 W
374	374	M	SEP	5	1984	42	19.1	G	317	33 28 10 N	119 01 48 W
375	375	M	SEP	5	1984	36	16.3	G	317	33 28 10 N	119 01 48 W
376	376	F	SEP	5	1984	30	13.6	G	317	33 28 10 N	119 01 48 W
377	377	M	SEP	5	1984	35	15.9	F	317	33 28 10 N	119 01 48 W
378	378	F	SEP	5	1984	33	15.0	G	317	33 28 10 N	119 01 48 W
379	379	F	SEP	5	1984	30	13.6	F	317	33 28 10 N	119 01 48 W

Animal condition codes: G = Good; F = Fair; and P = Poor

Table 4. (Continued)

Tag Number Left	Right	Sex	Date Tagged Month	Day	Year	Weight (lbs)	(kgs)	Animal Condition	BLM AREA	GEOGRAPHICAL POSITION LATITUDE	LONGITUDE
380	380	F	SEP	5	1984	17	7.7	P	317	33 28 10 N	119 01 48 W
381	381	M	SEP	5	1984	31	14.1	G	317	33 28 10 N	119 01 48 W
382	382	M	SEP	6	1984	35	15.9	G	317	33 28 10 N	119 01 48 W
383	383	M	SEP	6	1984	31	14.1	G	317	33 28 10 N	119 01 48 W
384	384	F	SEP	6	1984	39	17.7	G	317	33 28 10 N	119 01 48 W
385	385	M	SEP	6	1984	36	16.3	G	317	33 28 10 N	119 01 48 W
386	386	M	SEP	6	1984	46	20.9	G	317	33 28 10 N	119 01 48 W
387	387	F	SEP	6	1984	42	19.1	G	317	33 28 10 N	119 01 48 W
388	388	M	SEP	6	1984	45	20.4	G	317	33 28 10 N	119 01 48 W
389	389	F	SEP	6	1984	42	19.1	G	317	33 28 10 N	119 01 48 W
390	390	F	SEP	6	1984	36	16.3	G	317	33 28 10 N	119 01 48 W
391	391	F	SEP	6	1984	34	15.4	G	317	33 28 10 N	119 01 48 W
392	392	M	SEP	6	1984	34	15.4	G	317	33 28 10 N	119 01 48 W
393	393	F	SEP	6	1984	55	24.9	G	317	33 28 10 N	119 01 48 W
394	394	F	SEP	6	1984	34	15.4	G	317	33 28 10 N	119 01 48 W
395	395	M	SEP	6	1984	36	16.3	G	317	33 28 10 N	119 01 48 W
396	396	M	SEP	6	1984	36	16.3	G	317	33 28 10 N	119 01 48 W
397	397	F	SEP	6	1984	32	14.5	G	317	33 28 10 N	119 01 48 W
398	398	F	SEP	6	1984	23	10.4	G	317	33 28 10 N	119 01 48 W
399	399	M	SEP	6	1984	40	18.1	G	317	33 28 10 N	119 01 48 W
400	400	M	SEP	6	1984	34	15.4	G	317	33 28 10 N	119 01 48 W
401	401	F	SEP	6	1984	22	10.0	G	317	33 28 10 N	119 01 48 W
402	402	F	SEP	6	1984	35	15.9	G	317	33 28 10 N	119 01 48 W
403	403	M	SEP	6	1984	46	20.9	G	317	33 28 10 N	119 01 48 W
404	404	M	SEP	6	1984	43	19.5	G	317	33 28 10 N	119 01 48 W
405	405	F	SEP	6	1984	29	13.2	G	317	33 28 10 N	119 01 48 W
406	406	M	SEP	6	1984	44	20.0	G	317	33 28 10 N	119 01 48 W
407	407	?	SEP	6	1984	35	15.9	G	317	33 28 10 N	119 01 48 W
408	408	M	SEP	7	1984	37	16.8	G	317	33 28 10 N	119 01 48 W
409	409	M	SEP	7	1984	46	20.9	G	317	33 28 10 N	119 01 48 W
410	410	M	SEP	7	1984	31	14.1	G	317	33 28 10 N	119 01 48 W
411	411	F	SEP	7	1984	39	17.7	G	317	33 28 10 N	119 01 48 W
412	412	F	SEP	7	1984	38	17.2	G	317	33 28 10 N	119 01 48 W
413	413	M	SEP	7	1984	49	22.2	G	317	33 28 10 N	119 01 48 W
414	414	M	SEP	7	1984	46	20.9	G	317	33 28 10 N	119 01 48 W
415	415	M	SEP	7	1984	53	24.0	G	317	33 28 10 N	119 01 48 W
416	416	F	SEP	7	1984	39	17.7	G	317	33 28 10 N	119 01 48 W
417	417	M	SEP	7	1984	36	16.3	G	317	33 28 10 N	119 01 48 W
418	418	M	SEP	7	1984	53	24.0	G	317	33 28 10 N	119 01 48 W
419	419	F	SEP	7	1984	38	17.2	G	317	33 28 10 N	119 01 48 W
420	420	F	SEP	7	1984	57	25.9	G	317	33 28 10 N	119 01 48 W
421	421	F	SEP	7	1984	41	18.6	G	317	33 28 10 N	119 01 48 W
422	422	F	SEP	7	1984	31	14.1	G	317	33 28 10 N	119 01 48 W
423	423	M	SEP	7	1984	36	16.3	G	317	33 28 10 N	119 01 48 W

Animal condition codes: G = Good; F = Fair; and P = Poor

Table 4. (Continued)

Tag Number Left	Right	Sex	Date Tagged Month	Day	Year	Weight (lbs)	(kgs)	Animal Condition	BLM AREA	GEOGRAPHICAL POSITION LATITUDE	LONGITUDE
424	424	M	SEP	7	1984	29	13.2	G	317	33 28 10 N	119 01 48 W
425	425	F	SEP	7	1984	38	17.2	G	317	33 28 10 N	119 01 48 W
426	426	F	SEP	7	1984	37	16.8	G	317	33 28 10 N	119 01 48 W
427	427	M	SEP	7	1984	27	12.2	G	317	33 28 10 N	119 01 48 W
428	428	M	SEP	7	1984	51	23.1	G	317	33 28 10 N	119 01 48 W
429	429	F	SEP	7	1984	35	15.9	G	317	33 28 10 N	119 01 48 W
430	430	M	SEP	7	1984	41	18.6	G	317	33 28 10 N	119 01 48 W
431	431	F	SEP	7	1984	28	12.7	G	317	33 28 10 N	119 01 48 W
432	432	F	SEP	7	1984	37	16.8	G	317	33 28 10 N	119 01 48 W
433	433	M	SEP	7	1984	53	24.0	G	317	33 28 10 N	119 01 48 W
434	434	F	SEP	7	1984	37	16.8	G	317	33 28 10 N	119 01 48 W

Animal condition codes: G = Good; F = Fair; and P = Poor

Table 5. Northern elephant seal pups tagged with Dalton light blue reise tags at Santa Barbara Island, California in 1984, 1985 and 1986.

Tag Number Left	Right	Sex	Date Tagged Month	Day	Year	Animal Condition	BLM AREA	GEOGRAPHICAL POSITION LATITUDE	LONGITUDE
338	338	F	FEB	7	1984		304	33 28 45 N	119 02 37 W
339	339	F	FEB	7	1984		304	33 28 45 N	119 02 37 W
340	340	M	FEB	7	1984		304	33 28 45 N	119 02 37 W
341	341	?	FEB	7	1984		304	33 28 45 N	119 02 37 W
342	342	M	FEB	7	1984		310	33 28 57 N	119 02 23 W
343	343	?	FEB	7	1984		310	33 28 57 N	119 02 23 W
344	344	M	FEB	7	1984		310	33 28 57 N	119 02 23 W
345	345	M	FEB	7	1984		310	33 28 57 N	119 02 23 W
346	346	M	FEB	7	1984		310	33 28 57 N	119 02 23 W
347	347	F	FEB	7	1984		310	33 28 57 N	119 02 23 W
348	348	?	FEB	7	1984		310	33 28 57 N	119 02 23 W
349	349	?	FEB	7	1984		310	33 28 57 N	119 02 23 W
350	350	?	FEB	7	1984		310	33 28 57 N	119 02 23 W
---	351	?	FEB	7	1984		310	33 28 57 N	119 02 23 W
352	352	?	FEB	7	1984		310	33 28 57 N	119 02 23 W
353	353	M	FEB	7	1984		310	33 28 57 N	119 02 23 W
354	354	F	FEB	7	1984		310	33 28 57 N	119 02 23 W
355	355	M	FEB	7	1984		310	33 28 57 N	119 02 23 W
356	356	F	FEB	7	1984		310	33 28 57 N	119 02 23 W
357	357	?	FEB	7	1984		310	33 28 57 N	119 02 23 W
358	358	F	FEB	7	1984		310	33 28 57 N	119 02 23 W
359	359	?	FEB	7	1984		310	33 28 57 N	119 02 23 W
435	435	?	MAR	8	1985	G	310	33 28 57 N	119 02 23 W
436	436	?	MAR	8	1985	G	310	33 28 57 N	119 02 23 W
437	437	F	MAR	8	1985	G	310	33 28 57 N	119 02 23 W
438	438	F	MAR	8	1985	G	310	33 28 57 N	119 02 23 W
439	439	F	MAR	8	1985	G	310	33 28 57 N	119 02 23 W
440	440	F	MAR	8	1985	G	310	33 28 57 N	119 02 23 W
441	441	M	MAR	8	1985	F	310	33 28 57 N	119 02 23 W
442	442	F	MAR	8	1985	G	310	33 28 57 N	119 02 23 W
443	443	M	MAR	8	1985	G	310	33 28 57 N	119 02 23 W
444	444	M	MAR	8	1985	G	310	33 28 57 N	119 02 23 W
445	445	F	MAR	8	1985	G	310	33 28 57 N	119 02 23 W
446	446	F	MAR	8	1985	G	310	33 28 57 N	119 02 23 W
447	447	F	MAR	8	1985	G	310	33 28 57 N	119 02 23 W
448	448	F	MAR	8	1985	G	310	33 28 57 N	119 02 23 W
449	449	?	MAR	8	1985	G	310	33 28 57 N	119 02 23 W
450	450	F	MAR	8	1985	G	310	33 28 57 N	119 02 23 W
451	451	F	MAR	8	1985	G	310	33 28 57 N	119 02 23 W
452	452	F	MAR	8	1985	G	310	33 28 57 N	119 02 23 W
453	453	?	MAR	8	1985	G	310	33 28 57 N	119 02 23 W
454	454	M	MAR	8	1985	G	310	33 28 57 N	119 02 23 W

Animal condition codes: G = Good; F = Fair; and P = Poor

Table 5. (Continued)

Tag Number Left	Right	Sex	Date Tagged Month	Day	Year	Animal Condition	BLM AREA	GEOGRAPHICAL POSITION LATITUDE	LONGITUDE
455	455	F	MAR	8	1985	G	310	33 28 57 N	119 02 23 W
456	456	F	MAR	8	1985	G	310	33 28 57 N	119 02 23 W
457	457	F	MAR	8	1985	G	310	33 28 57 N	119 02 23 W
458	458	M	MAR	8	1985	G	310	33 28 57 N	119 02 23 W
459	459	F	MAR	8	1985	G	310	33 28 57 N	119 02 23 W
460	460	F	MAR	8	1985	G	310	33 28 57 N	119 02 23 W
461	461	F	MAR	9	1985	G	310	33 28 57 N	119 02 23 W
462	462	F	MAR	9	1985	G	310	33 28 57 N	119 02 23 W
463	463	M	MAR	9	1985	G	310	33 28 57 N	119 02 23 W
---	464	?	MAR	9	1985	G	310	33 28 57 N	119 02 23 W
465	466	F	MAR	9	1985	G	310	33 28 57 N	119 02 23 W
467	467	F	MAR	9	1985	G	310	33 28 57 N	119 02 23 W
468	468	M	MAR	11	1985	G	310	33 28 57 N	119 02 23 W
469	469	F	MAR	11	1985	G	310	33 28 57 N	119 02 23 W
470	470	F	MAR	11	1985	G	310	33 28 57 N	119 02 23 W
471	471	M	MAR	11	1985	G	310	33 28 57 N	119 02 23 W
472	472	M	MAR	11	1985	G	310	33 28 57 N	119 02 23 W
473	473	F	MAR	11	1985	G	310	33 28 57 N	119 02 23 W
474	474	M	MAR	11	1985	G	310	33 28 57 N	119 02 23 W
475	475	M	MAR	11	1985	G	310	33 28 57 N	119 02 23 W
476	476	M	MAR	11	1985	G	310	33 28 57 N	119 02 23 W
477	477	M	MAR	11	1985	G	310	33 28 57 N	119 02 23 W
478	478	F	MAR	11	1985	G	310	33 28 57 N	119 02 23 W
479	479	F	MAR	11	1985	G	310	33 28 57 N	119 02 23 W
480	480	F	MAR	11	1985	G	310	33 28 57 N	119 02 23 W
481	481	M	MAR	11	1985	G	310	33 28 57 N	119 02 23 W
482	482	M	MAR	11	1985	G	310	33 28 57 N	119 02 23 W
483	483	F	MAR	11	1985	G	310	33 28 57 N	119 02 23 W
484	484	F	MAR	11	1985	G	310	33 28 57 N	119 02 23 W
485	485	M	MAR	11	1985	G	310	33 28 57 N	119 02 23 W
486	486	M	MAR	11	1985	G	310	33 28 57 N	119 02 23 W
487	487	M	MAR	11	1985	G	310	33 28 57 N	119 02 23 W
488	488	F	MAR	11	1985	G	310	33 28 57 N	119 02 23 W
489	489	F	MAR	11	1985	G	310	33 28 57 N	119 02 23 W
490	490	M	MAR	11	1985	G	310	33 28 57 N	119 02 23 W
492	492	M	MAR	20	1986	F	310	33 28 57 N	119 02 23 W
493	493	F	MAR	20	1986	G	310	33 28 57 N	119 02 23 W
494	494	F	MAR	20	1986	F	310	33 28 57 N	119 02 23 W
495	495	F	MAR	20	1986	G	310	33 28 57 N	119 02 23 W
496	496	M	MAR	20	1986	G	310	33 28 57 N	119 02 23 W
497	497	F	MAR	20	1986	G	310	33 28 57 N	119 02 23 W
498	498	F	MAR	20	1986	G	310	33 28 57 N	119 02 23 W
499	499	F	MAR	20	1986	G	310	33 28 57 N	119 02 23 W
500	500	M	MAR	20	1986	G	310	33 28 57 N	119 02 23 W

Animal condition codes: G = Good; F = Fair; and P = Poor

Table 5. (Continued)

Tag Number Left	Right	Sex	Date Tagged Month	Day	Year	Animal Condition	BLM AREA	GEOGRAPHICAL POSITION LATITUDE	LONGITUDE
501	501	F	MAR	20	1986	G	310	33 28 57 N	119 02 23 W
502	502	F	MAR	20	1986	G	310	33 28 57 N	119 02 23 W
503	503	F	MAR	20	1986	G	310	33 28 57 N	119 02 23 W
504	504	M	MAR	20	1986	G	310	33 28 57 N	119 02 23 W
505	505	M	MAR	20	1986	G	310	33 28 57 N	119 02 23 W
506	506	M	MAR	20	1986	F	310	33 28 57 N	119 02 23 W
507	507	M	MAR	20	1986	G	310	33 28 57 N	119 02 23 W
508	508	F	MAR	20	1986	G	310	33 28 57 N	119 02 23 W
509	509	F	MAR	20	1986	G	310	33 28 57 N	119 02 23 W
510	510	?	MAR	20	1986	G	310	33 28 57 N	119 02 23 W
511	511	M	MAR	20	1986	G	310	33 28 57 N	119 02 23 W
512	512	F	MAR	20	1986	G	310	33 28 57 N	119 02 23 W
513	513	F	MAR	20	1986	G	310	33 28 57 N	119 02 23 W
514	514	M	MAR	20	1986	G	310	33 28 57 N	119 02 23 W
515	515	M	MAR	20	1986	G	310	33 28 57 N	119 02 23 W
516	---	M	MAR	20	1986	G	310	33 28 57 N	119 02 23 W
---	517	M	MAR	20	1986	F	310	33 28 57 N	119 02 23 W
518	---	M	MAR	20	1986	F	310	33 28 57 N	119 02 23 W
519	---	M	MAR	20	1986	G	310	33 28 57 N	119 02 23 W
520	---	M	MAR	20	1986	G	310	33 28 57 N	119 02 23 W
---	521	M	MAR	20	1986	G	310	33 28 57 N	119 02 23 W
522	---	M	MAR	20	1986	G	310	33 28 57 N	119 02 23 W
523	---	F	MAR	20	1986	F	310	33 28 57 N	119 02 23 W
524	---	M	MAR	20	1986	F	310	33 28 57 N	119 02 23 W

Animal condition codes: G = Good; F = Fair; and P = Poor

Figure 1. Location of Santa Barbara Island.

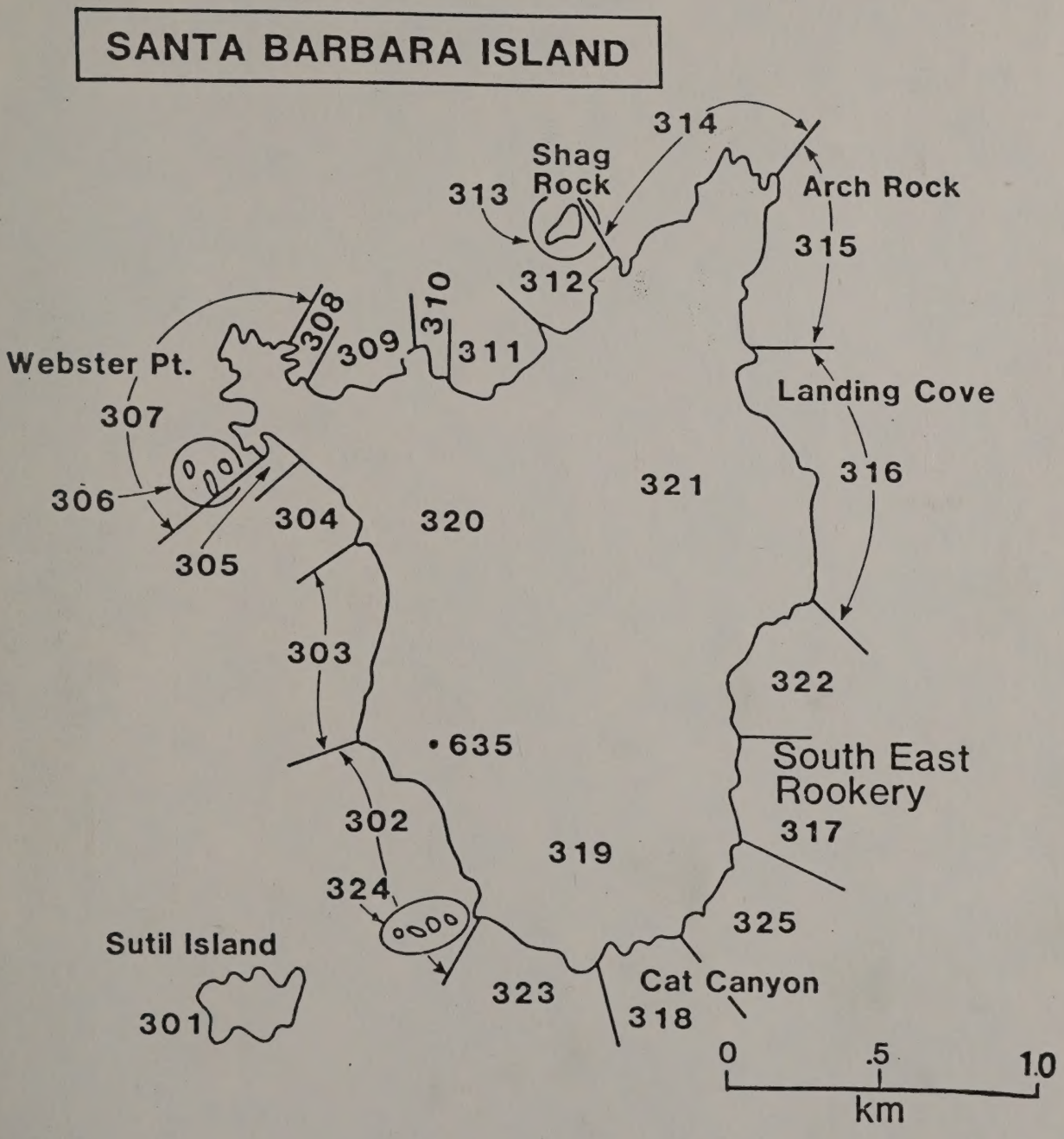

Figure 2. Summary of BLM codes for Santa Barbara Island.

SANTA BARBARA ISLAND
0
10
Km